DISASTER MANAGEMENT WEB APPLICATION

A Mini-Project Report Submitted
For
Partial Fulfilment of the Requirements of the
Degree of Bachelor of Engineering

In

COMPUTER ENGINEERING

(Semester III)
By

Austin Dmello (Roll No. 9954)

Ankit Maity (Roll No. 9975)

Shaun Mathias (Roll No. 9977)

Moin Chunawala (Roll No. 9950)

Under the guidance of

Prof. Jagruti Nagaonkar

DEPARTMENT OF COMPUTER ENGINEERING

Fr. Conceicao Rodrigues College of Engineering

Bandra (W), Mumbai - 400050

University of Mumbai

2023-2024

This work is dedicated to my family.
I am very thankful for their motivation and support.

CERTIFICATE

This is to certify that the mini-project entitled **"DISASTER MANAGEMENT WEB APPLICATION"** is a bonafide work of **"Austin Dmello (Roll No. 9954), Ankit Maity (Roll No. 9975), Shaun Mathias (Roll No. 9977), Moin Chunawala (Roll No. 9950)"** submitted to the University of Mumbai in partial fulfillment of the requirement for the award of the degree of **Bachelor of Engineering** in **Computer Engineering** (Semester- III).

Prof. Jagruti Nagaonkar

Guide/ Supervisor

Dr. Sujata Deshmukh

Dr. S. S. Rathod

Approval Sheet

Mini Project Report Approval for S.E. (Semester-III)

This mini-project report entitled **DISASTER MANAGEMENT WEB APPLICATION** submitted by **Austin Dmello (Roll No. 9954), Ankit Maity (Roll No. 9975), Shaun Mathias (Roll No. 9977), Moin Chunawala (Roll No. 9950)** is approved for the degree of Bachelor of Engineering in **Computer Engineering** (Semester-III).

Examiner 1.———————————

Examiner 2. ———————————

Date:

Place:

Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Austin Dmello
9954

Ankit Maity
9975

Shaun Mathias
9977

Moin Chunawala
9950

Date:

Abstract

Disaster management is a critical process aimed at reducing the impact of natural or human-induced disasters on communities and societies. The Disaster Management Website project aims to develop an online platform that facilitates efficient disaster preparedness and response for communities. In times of increasing climate-related events and natural disasters, empowering individuals and communities with essential information and resources is crucial for minimizing the impact of such emergencies. The website is a comprehensive disaster management tool that offers features such as real-time disaster alerts, evacuation routes, emergency contacts, and a community forum for communication and collaboration. The platform provides users with user-friendly interfaces, making it accessible to individuals of all ages and technical expertise. This project seeks to empower individuals, communities, and organizations to build resilience in adversity. By providing easy access to crucial information and fostering collaboration, the platform strives to facilitate effective disaster management that reduces loss of life and property. In conclusion, the Disaster Management Website project endeavors to make a significant impact in the field of disaster management by bridging the gap between information and action. The platform's interactive and inclusive design promises to enhance disaster preparedness, response, and recovery efforts, ultimately contributing to the safety and well-being of communities worldwide.

Acknowledgments

We have great pleasure in presenting the report on "**Disaster Management Web Application**". I take this opportunity to express my sincere thanks to our project guide Prof. Jagruti Nagaonkar, Fr. C.R.C.E, Bandra (W), Mumbai, for providing the technical guidelines, and the suggestions regarding the line of this work. We enjoyed discussing the work progress with her during our visits to the department.

We thank Dr. Sujata Deshmukh, Head of the Computer Engineering department, Principal, and the management of C.R.C.E., Mumbai for encouraging and providing the necessary infrastructure for pursuing the project.

We also thank all non-teaching staff for their valuable support, to complete our project.

Date:

Austin Dmello (Roll No. 9954)
Ankit Maity (Roll No. 9975)
Shaun Mathias (Roll No. 9977)
Moin Chunawala (Roll No. 9977)

Table of Content

Chapter No	Topic	Page No.
	Abstract	i-viii
1	Introduction	1
2	Objective	2
3	Scope	3
4	Review of Literature	4-7
5	Proposed System	8-9
5.1	Drawbacks of Existing Systems	8-9
5.2	Problem Statement	9
6	System Design	10-12
6.1	Block Diagram	10
6.2	Database Design	11-12
6.3	Programming Languages Used	12
7	Implementation	13
8	Results	14-17
	References	18
	Appendix	19

List of Figures

Figure No.	Figure Name	Page No.
6.1	Steps to access the website	19
6.2	Architecture of the website	19
6.3	Database Tables	20
6.4	Databasewith User Details	20
8.1	Sign Up Page	22
8.2	Login Page	22
8.3	Home Page	23
8.4	Resources Page	23
8.5	History of Disasters Page	24
8.6	Contact and Help Page	24
8.7	Maps Page	25

Chapter 1

INTRODUCTION

In our increasingly interconnected and climate-vulnerable world, disaster management has emerged as a pivotal discipline. The "Disaster Management Web Application" project represents an ambitious and purpose-driven endeavor within the realm of web development. It seeks to address the critical need for comprehensive disaster preparedness and response mechanisms. With a backdrop of mounting climate-related events and evolving natural and human-induced threats, this project aspires to act as a linchpin in bridging the information-action gap that is central to effective disaster management.

At its core, the web application is envisioned as a versatile and responsive platform that combines various essential features. It provides real-time disaster alerts, offering users immediate insights into emerging crises. Moreover, it aids in planning and executing safe evacuation routes, making it an indispensable tool in the face of sudden disasters. In conjunction with this, the platform offers a repository of vital emergency contact information, facilitating prompt communication and response. Additionally, it features a community forum where individuals and communities can interact, share experiences, and collaborate to bolster their collective resilience. Accessibility and inclusivity are integral; user-friendly interfaces ensure that individuals of varying technical proficiencies and ages can seamlessly navigate the platform. This project is far more than a mere website; it is a dynamic instrument, a beacon of hope in times of distress, and a testament to the transformative power of technology and human collaboration.

Furthermore, this initiative is inherently global in its reach. It transcends geographic boundaries and cultural divides, standing as a testament to the universal nature of disaster management. Its potential impact extends beyond a single community or nation, as it seeks to enhance disaster preparedness, response, and recovery efforts on a global scale. In essence, the "Disaster Management Web Application" is a catalyst for societal resilience and safety in the face of adversity, epitomizing the fusion of technology, humanity, and a shared commitment to mitigating the impact of disasters on our world.

Chapter 2

OBJECTIVES OF THE PROJECT

2.1. Disaster Alerts, Resources, and Evacuation Routes.

The website's first objective is to act as a source of information during disasters. It will provide alerts to let people know when a disaster is happening and share educational resources to help them stay safe. Additionally, the platform will offer evacuation routes, showing the paths to follow in case of an emergency. This objective aims to keep the community well-informed and prepared.

2.2. Enhancing Disaster Preparedness and Proactive Decision-Making.

This objective focuses on making individuals and communities more prepared for disasters. The website will offer guidance and tools to help people get ready in advance. When a disaster occurs, it will help users make quick, informed decisions to protect themselves and their families. This helps people to be proactive and ready for tough times.

2.3. User-Friendly and Inclusive Design.

The website will be easy for everyone to use, whether they're young or old, tech-savvy or not. It will have a user-friendly design that makes it simple to find information and take action. This inclusivity means that no one will be left behind when it comes to disaster management. The platform will be accessible to people of all ages and technical backgrounds.

2.4. Integration with Emergency Services.

To make it as easy as possible for people to get help, the platform will display local emergency services. It will provide assistance to users and help them to contact the right people quickly. This direct link to emergency services can save valuable time when every moment counts.

2.5. Provide information about past disasters and their evacuation techniques.

The history of disasters section will provide information about the previously occurred disasters. This will help people cope with similar disasters as those that happened in the past so that they can evacuate safely. It also aims to reduce commotion and panic among the people as it can provide a structured way to overcome the current disaster.

Chapter 3
SCOPE OF THE PROJECT

Disasters such as earthquakes, floods, hurricanes, wildfires, and pandemics have devastating consequences on human lives, infrastructure, and the environment. Communities often face challenges in effectively responding to these emergencies, leading to significant loss of life and property. The scope of the project revolves around addressing these challenges and empowering communities with the tools and information they need to better cope with disasters. The Disaster Management Website aims to provide a centralized, user-friendly platform that offers disaster alerts, evacuation routes, emergency contacts, and educational resources.

Chapter 4

REVIEW OF LITERATURE

4.1. A FULLY AUTOMATIC METHOD FOR RAPIDLY MAPPING IMPACTED AREA BY NATURAL DISASTER

4.1.1. Introduction

Deep learning-based change detection methods have achieved state-of-the-art performance in several recent studies. However, such methods usually are supervised, and therefore a large number of training samples is often a requisite. Manually preparing those training samples is not only expensive but also time-consuming, which does not fit the need to rapidly map the impacted area caused by natural disasters for further rescue missions and damage assessment. In this study, a fully automatic method was proposed to address the issue by automating training sample generation for mapping the impacted area caused by natural disasters. The authors used the 2011 tornado event in Joplin, Missouri, US, as an example of its application. The generated impacted area map was both visually and quantitatively evaluated against the ground truth data collected by the US Federal Emergency Management Agency (FEMA). The results show that the map matches well with the FEMA ground truth data with 86% of major-damaged and destroyed buildings identified by FEMA on the ground also detected by this fully automatic framework using very high resolution (VHR) satellite images.

4.1.2. Paper Summary

The map of the impacted area is automatically generated by the proposed method. The visual evaluation indicates the map matches well with the moving trace of the tornado in Joplin used as the sample. To quantitatively evaluate the quality of the map, ground truth data collected by the US Federal Emergency Management Agency (FEMA) is overlaid on top of the map. Only the major damaged and destroyed buildings identified by FEMA were used in the quantitative evaluation. The map aligns well with the FEMA ground truth data with 3722 out of 4319 assessed structures that are declared as destroyed and damaged covered in the detected impacted area. The authors have shown the proposed framework can successfully derive the impacted area without labeling efforts while delivering favorable results for the tornado case study. The authors would test their workflow on the areas impacted by other types of natural disasters, such as hurricanes, earthquakes, fires, and flooding to show the generalization capability of this work.

4.2. WebReLog: A Web-based Tool for Disaster Relief Logistics with Vehicle Route Planning

4.2.1. Introduction

Disaster is a dreadful event and it has wreaked havoc on nature and civilization. To mitigate the effects of disaster, different organizations are involved in disaster relief operations. Their strategy should be efficient and well-planned for response and rescue operations to meet humanitarian needs. The main objective of these organizations is to provide emergency supplies to victims immediately while reducing the impact of disaster. In reality, the situation can be more complex due to traffic conditions, dynamic route changes, dynamic demand changes, people's behavior, available relief vehicle, and their capacity constraints. In this paper, a web-based tool is integrated to obtain routes of relief vehicles with split delivery, and multiple demands types, i.e., logistics, ambulance, and evacuation considered. The method presented also calculates the total time of serving, the number of trips by each vehicle, and the number of people served which is helpful for organizations to operate in real situations.

4.2.2. Paper Summary

This paper presents the WebReLog system for managing emergency logistics distribution. It immediately schedules the vehicles considering multiple commodities and estimates the total serving time. Using the real location coordinates, routes are visualized on a map for efficient scheduling and operation. In this work, two algorithms are also proposed, priority-based (PBRF) and the hybrid algorithm (HRF), for post-disaster relief distribution while considering the real disaster constraints. The proposed algorithms satisfy multiple items, multiple vehicles with variable capacity, multiple trips, and split delivery scenarios. This WebReLog model can be applied to various disaster scenarios in the real world. However, due to connectivity problems, there will be difficulties in getting the details of the broken links in case of real disaster situations. This system can be further improved by adding the tracking functionality for each vehicle.

4.3. A Utility Driven Post Disaster Emergency Resource Allocation System Using DTN

4.3.1. Introduction

Disasters like hurricanes, earthquakes, floods, and others cause immense physical destruction and loss of life and property around the world. An efficient disaster relief response network consists of coordinating the distribution of emergency resources from supply centers to the shelters in affected areas. In this paper, we assume an underlying DTN-enabled smartphone-based communication network and propose an opportunistic knowledge-sharing scheme. The scheme uses stable human mobility characteristics to build a coherent global view of resource needs in the entire disaster-affected area. Such needs are opportunistically transmitted to the control station at regular intervals.

4.3.2. Paper Summary

In this paper, the authors derive and use a utility function to enumerate the utility of emergency resources; propose an opportunistic knowledge-sharing approach for collection and propagation of resource needs over DTN; and finally, formulate a utility-driven optimal resource allocation model to minimize resource deficit and resource deployment time. The novelty of our system is that it is utility-driven and works with impaired network connectivity. Simulation results justify that our system performs better than other competing schemes in a fully connected network environment and performs almost as well as others even in a sparse network environment. In future work, the authors intend to propose a distributed resource allocation model so that nearby shelters can pool each other's resources in a decentralized manner until resources from the control station arrive. They also aim to enhance the deployment time minimization problem by shipping multiple consignments at a time.

4.4. A HYBRID MODEL BASED ON FUSED FEATURES FOR DETECTION OF NATURAL DISASTERS FROM SATELLITE IMAGES

4.4.1. Introduction

Earthquakes, floods, tsunamis, and other natural disasters are appearing as worldwide threats because of their widespread destruction that results in thousands of human and economic losses. First responders need to know the root cause of damages in a region so that the emergency response activities can be planned accordingly and more effectively. The authors proposed a framework for the detection and recognition of natural disasters from satellite images. In this work, satellite images of six different types of disasters are considered, namely earthquakes, volcanic eruptions, floods, tsunamis, and hurricanes. The framework relies on the fusion of wavelet image scattering features and local binary pattern features for constructing the final feature vector. They have also compared the accuracy of our framework with the existing state-of-the-art hand-crafted and machine-learning models. Simulation results confirm that the proposed framework can recognize the type of natural disaster from the satellite images with an accuracy of 99.59% (Kappa coefficient 98.54% and F-Score 99.40%). The proposed approach results in less computational cost while achieving better accuracy compared to the deep convolutional neural network. They believe that the proposed model can be integrated with satellite imagery for locating the geographical regions affected by multiple natural disaster events at the same time or in short intervals.

4.4.2. Paper Summary

In this paper, the authors have proposed a hybrid model based on fused features for the detection of natural disasters in near real-time from satellite images. They presented a novel hybrid model based on the fusion of LBP and wavelet image scattering features to extract useful information from images. They have used a bootstrap-aggregated decision tree for classifying the satellite images. The simulation results proved that the proposed framework can differentiate different natural disasters with an accuracy of 99.59%. They have also demonstrated the accuracy and efficiency of the proposed framework over multiple simulation scenarios. The proposed model can be integrated with satellite imagery to locate the geographical locations that are affected by these natural disasters. In future work, they will include other types of disaster images (such as landslides and drought) to test the proposed framework generalization capability.

Chapter 5
PROPOSED SYSTEM

5.1 DRAWBACKS OF EXISTING SYSTEM

Existing disaster management plans, while essential, often have certain drawbacks and challenges, which can include:

Lack of Accessibility and Inclusivity:

Many disaster management plans may not be accessible or inclusive, potentially leaving out individuals with disabilities or those who have limited access to technology. This can hinder their ability to receive critical information and assistance.

Communication Gaps:

In some cases, there are communication gaps between authorities, emergency services, and the public. Clear and timely information dissemination can be a challenge, leading to confusion during disasters.

Limited Real-Time Updates:

Traditional disaster management plans may struggle to provide real-time updates and information to the public. This can be particularly problematic in rapidly evolving situations.

Complexity and Lack of User-Friendliness:

Some plans may be overly complex and difficult for the average person to understand and follow, leading to a lack of public engagement and effective response.

Resource Allocation Challenges:

The allocation of resources, such as emergency supplies, medical personnel, and transportation, can be challenging to coordinate, resulting in delays in assistance.

Inadequate Support for Vulnerable Populations:

Many disaster plans may not adequately address the unique needs of vulnerable populations, such as the elderly, children, and those with disabilities, potentially putting them at greater risk.

Limited Community Collaboration:

In some cases, there is insufficient focus on community collaboration and peer-to-peer support, which can be valuable in disaster response.

5.2 PROBLEM STATEMENT

Create an efficient Disaster Management Website to enhance community resilience and safety in the face of disasters by helping people to cope up and find necessary aid during the event of a disaster.

Chapter 6

SYSTEM DESIGN

6.1 BLOCK DIAGRAMS

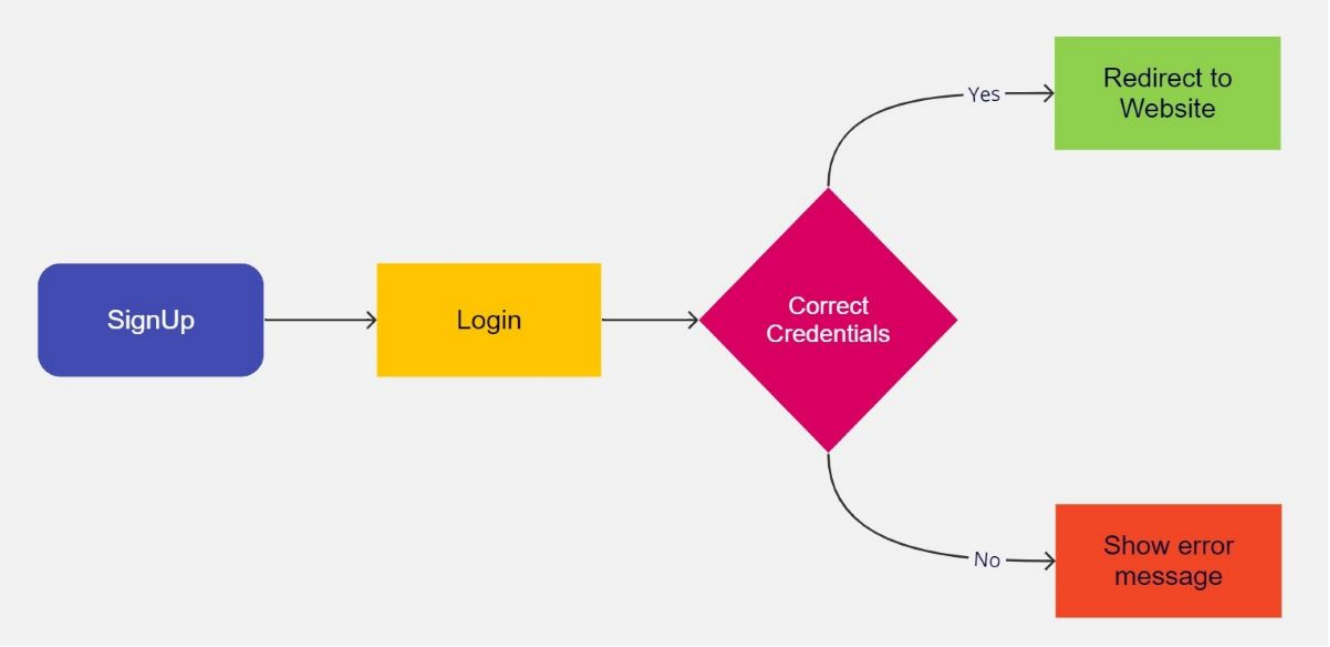

Figure 6.1 (Steps to access the website)

Figure 6.2 (Architecture of the website)

6.2 DATABASE DESIGN

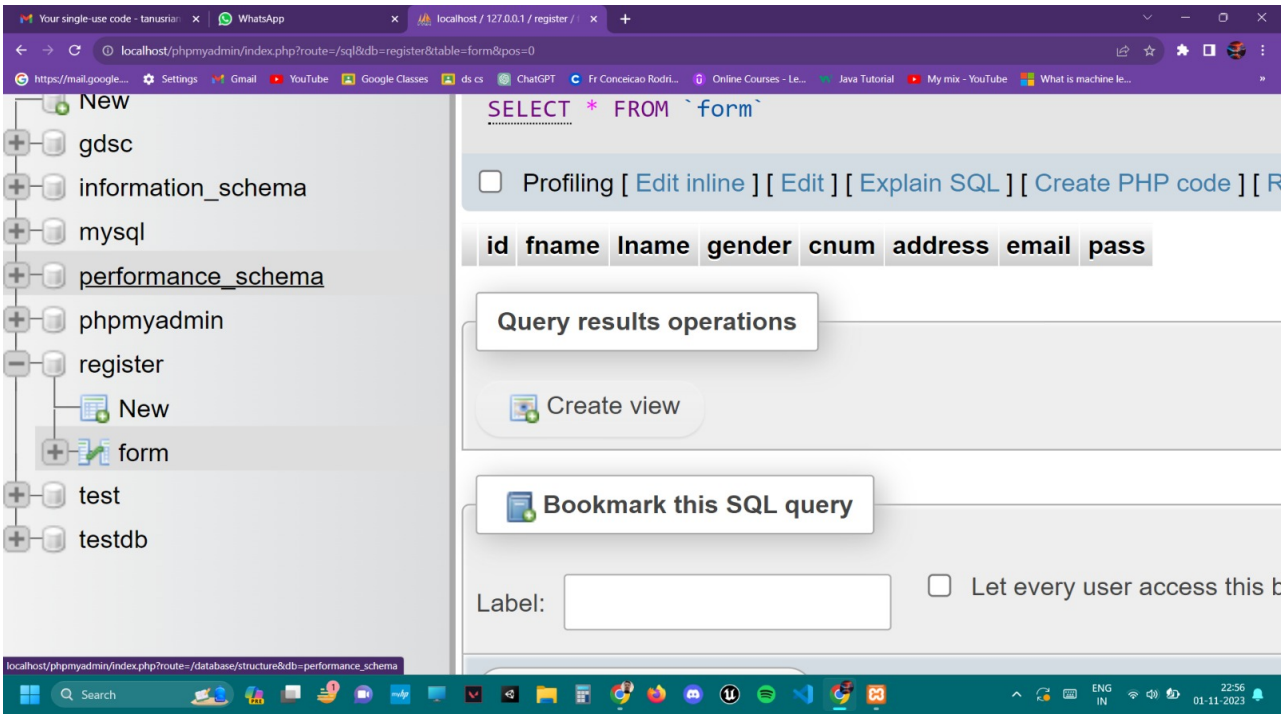

Figure 6.3 (Database Tables)

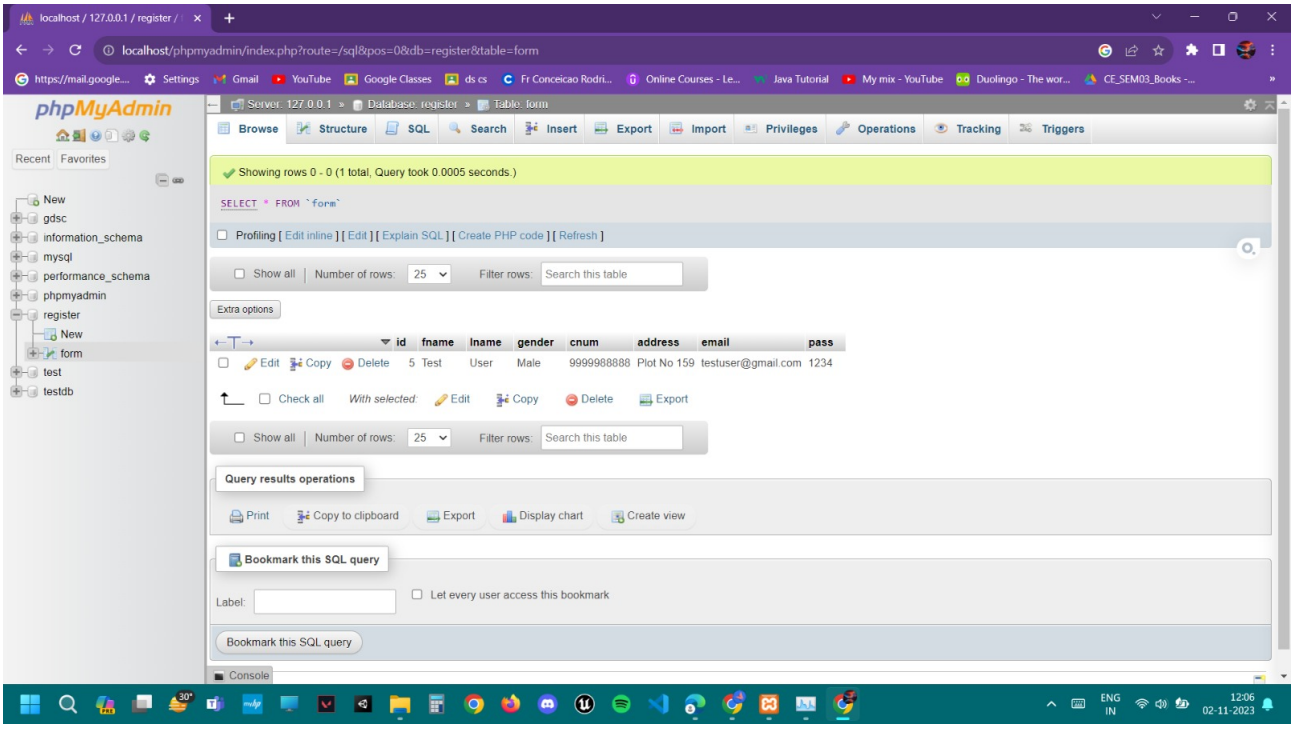

Figure 6.4 (Database with User Details)

The MySQL Database for the website consists of the following tables:
ID, first name, last name, gender, contact numbers, address, email, and password. The email is used for login. After the User signs up on the website on the Sign-Up page, they can log in using the Login page. The User's details are stored in the database after signing up. The Login page has inputs for email and password. The credentials are validated by matching the values from the database. If the User enters the correct credentials, they are redirected to the Disaster Management Website Home Page. If the credentials are incorrect, an error message is shown.

6.3 PROGRAMMING LANGUAGES USED

HTML: HTML is used to create the structure of the website, along with all the tabs and the information displayed within them.

CSS: CSS is used to enhance the overall appearance of the website and to make it user-friendly. It is also used to style the website and make it visually appealing.

Javascript: Javascript is used to add functionality to the website and to perform various tasks when a particular action is invoked.

PHP: PHP is used to make the website dynamic and interactive. It is used for server-side scripting and connecting to the MySQL Database.

Chapter 7

IMPLEMENTATION

- **User Authentication**
  The Website consists of a signup page (for new users) and a login page (for existing users). The registration and login system was implemented using PHP and MySQL. Users can securely create accounts and log in to access personalized content.

- **Home Page**
  The information about current disasters and the links to the Disaster Management Websites of India have been displayed on the Home page. It also has information about the website.

- **Resources Page**
  The Resources page is divided into Natural and Man-made disasters. This page displays the guidelines to follow when a disaster occurs and the appropriate action to be taken to safeguard the people.

- **History of Disasters Page**
  The History of Disasters page displays past disasters and their information. Users can use this information to prepare themselves if similar disasters occur in the future.

- **Contact and Help Page**
  The Contact and Help page provides contact and support information, making it easy for users to find essential resources during emergencies.

- **Maps Page**
  The Maps page allows users to find aid and get information about evacuation routes. It also helps to find nearby sources of help during crucial times.

- **Logout**
  The user is redirected to the login page after clicking the logout button.

Chapter 8

RESULTS

The results of the Disaster Management Website are shown below:

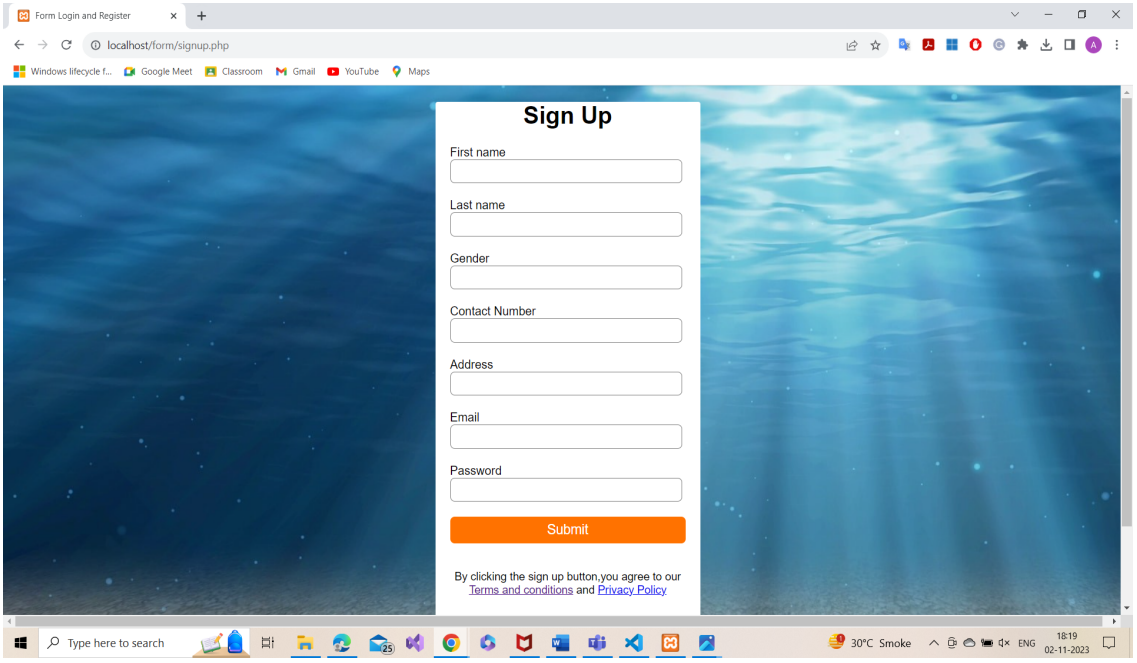

Figure 8.1 (Sign Up Page)

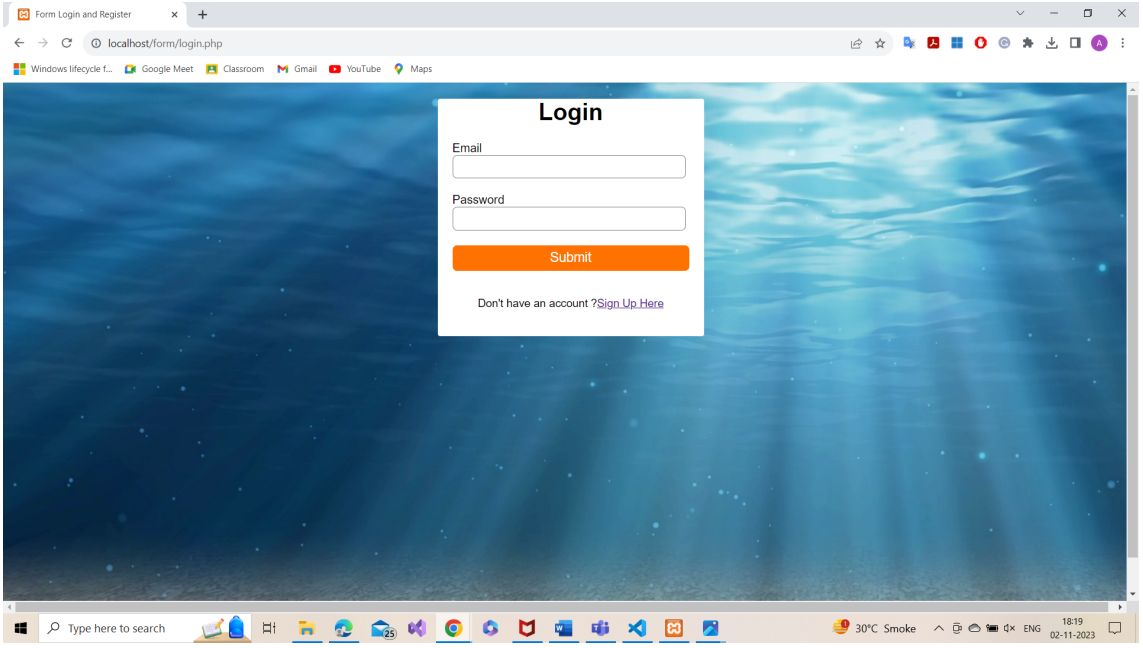

Figure 8.2 (Login Page)

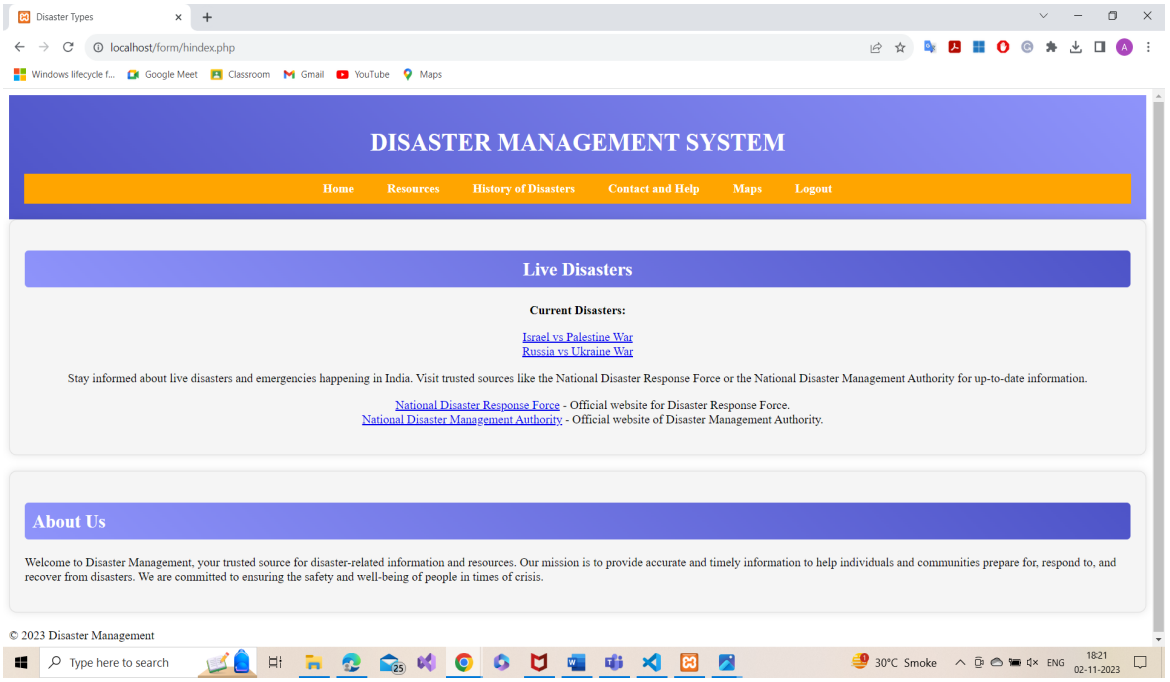

Figure 8.3 (Home Page)

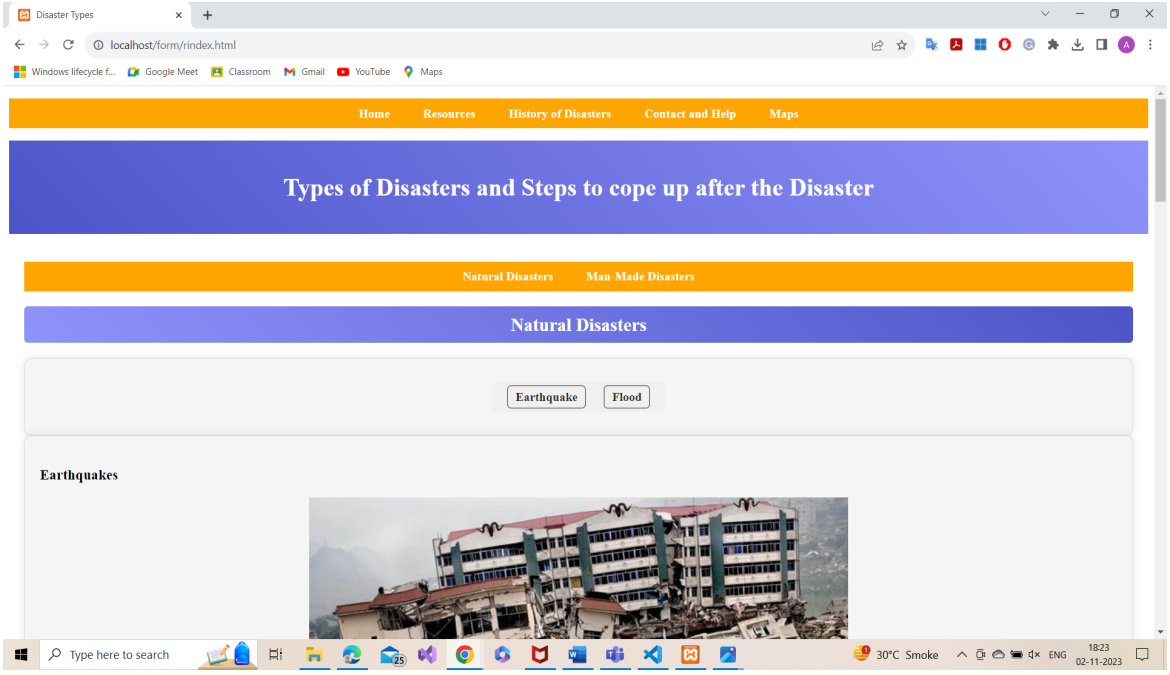

Figure 8.4 (Resources Page)

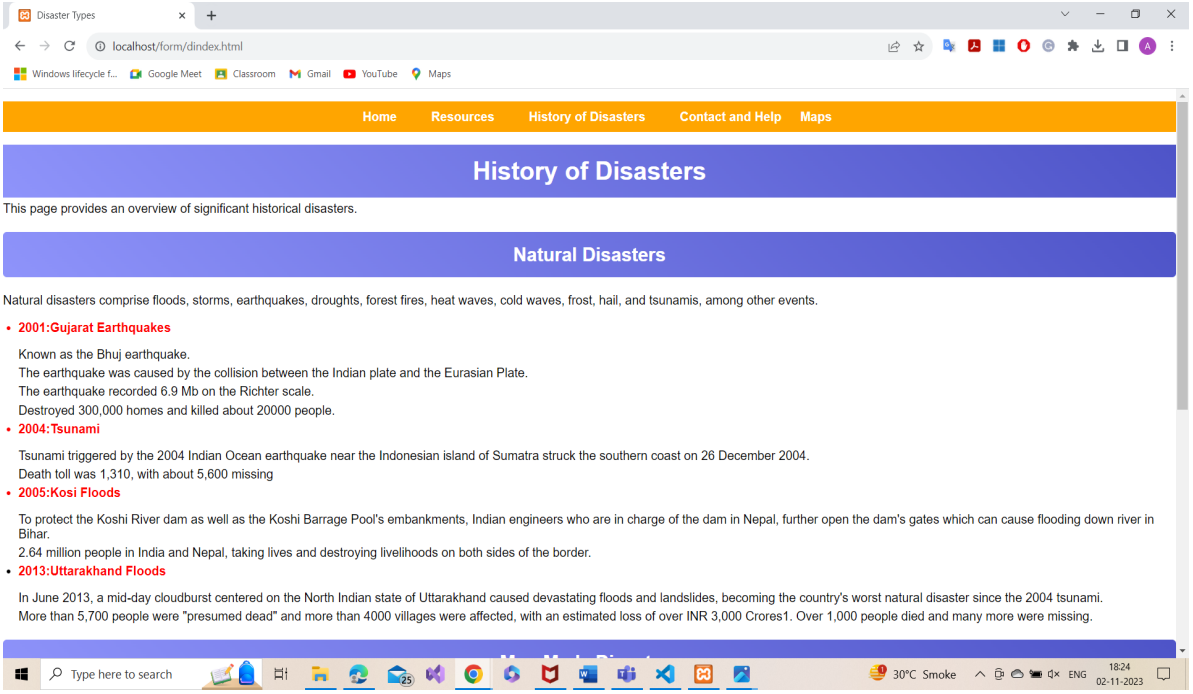

Figure 8.5 (History of Disasters Page)

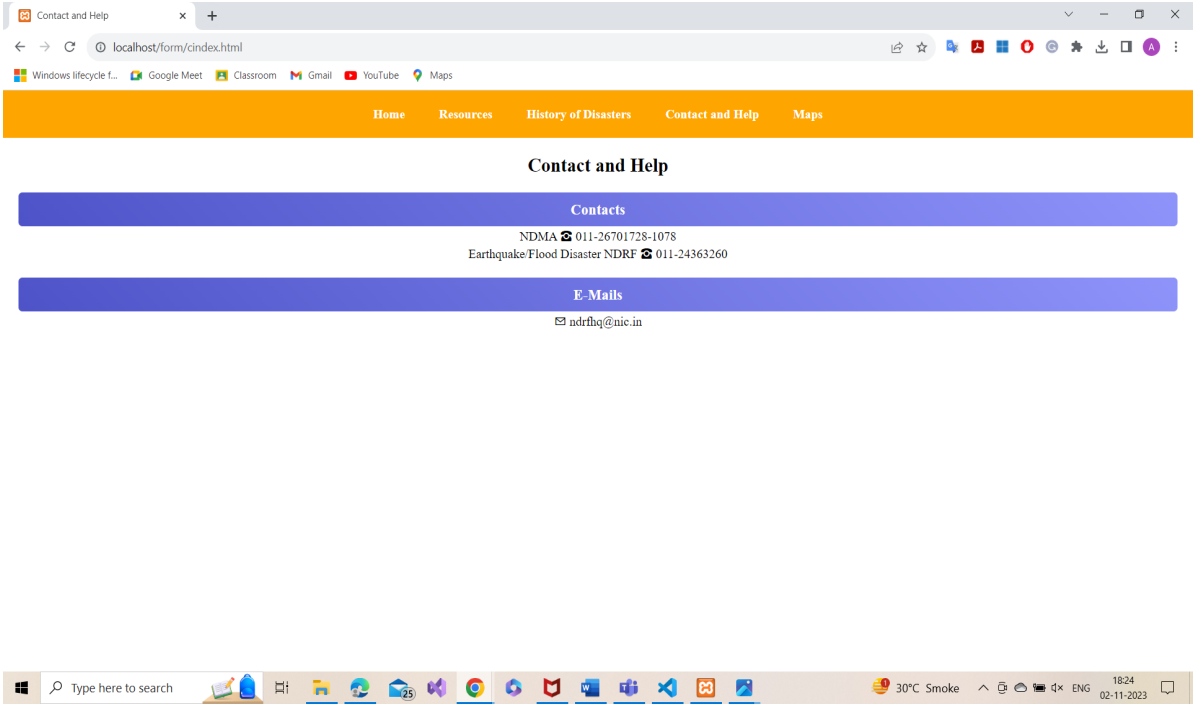

Figure 8.6 (Contact and Help Page)

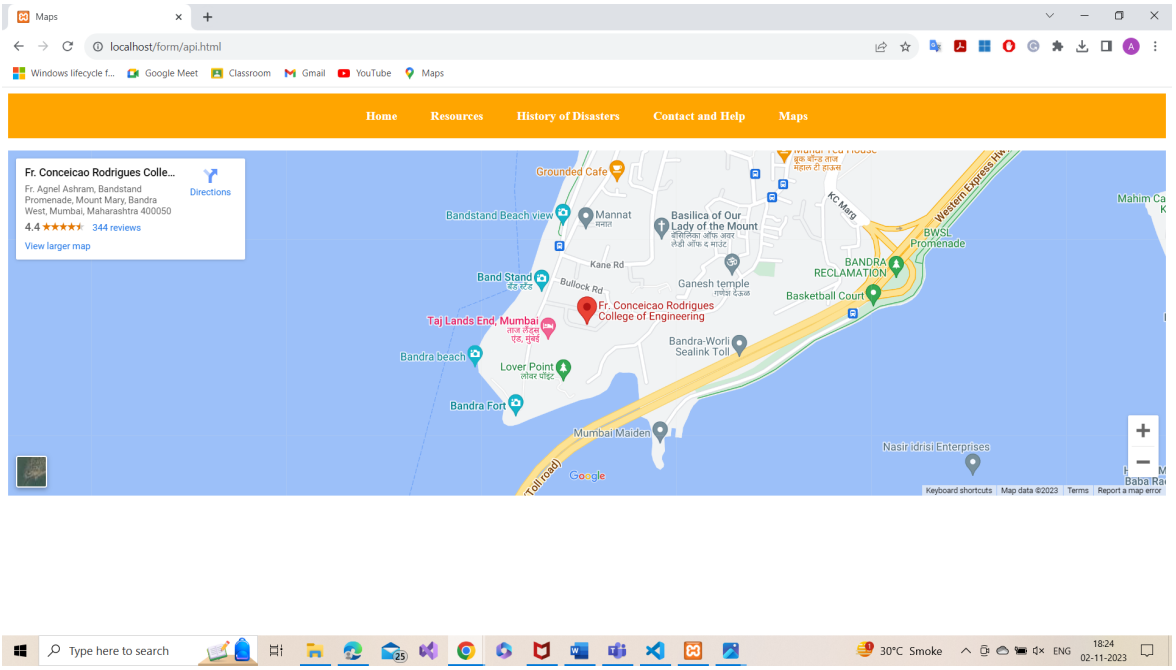

Figure 8.7 (Maps Page)

REFERENCES

1. Liu and L. Yang, "A Fully Automatic Method for Rapidly Mapping Impacted Area by Natural Disaster," IGARSS 2020 - 2020 IEEE International Geoscience and Remote Sensing Symposium, Waikoloa, HI, USA, 2020, pp. 6906-6909, doi: 10.1109/IGARS S39084.2020.9323634.

2. N. Gupta, T. Gupta, S. Samaddar and S. Roy, "WebReLog: A Web-based Tool for Disaster Relief Logistics with Vehicle Route Planning," 2019 IEEE International Conference on Systems, Man and Cybernetics (SMC), Bari, Italy, 2019, pp. 1012-1017, doi: 10.1109/SMC.2019.8913925.

3. S. Basu, S. Roy, S. Bandyopadhyay and S. Das Bit, "A Utility Driven Post Disaster Emergency Resource Allocation System Using DTN," in *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, vol. 50, no. 7, pp. 2338-2350, July 2020, doi: 10.1109/TSMC.2018.2813008.

4. T. Gupta and S. Roy, "A Hybrid Model based on Fused Features for Detection of Natural Disasters from Satellite Images," IGARSS 2020 - 2020 IEEE International Geoscience and Remote Sensing Symposium, Waikoloa, HI, USA, 2020, pp. 1699-1702, doi: 10.1109/IGARSS39084.2020.9324611.

APPENDIX-I